DOCUMENT RESUME

ED 407 570 CE 074 003

AUTHOR Millan, Jaime; And Others
TITLE Analysis of Chilean Forestry Occupations: An International Partnership Model.
PUB DATE Dec 96
NOTE 17p.; Paper presented at the American Vocational Association Convention (Cincinnati, OH, December 5-8, 1996).
PUB TYPE Reports - Research (143) -- Speeches/Meeting Papers (150)
EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS Adult Education; Continuing Education; *Curriculum Development; *Economic Development; Foreign Countries; *Forestry; Forestry Occupations; *International Educational Exchange; International Trade; Job Skills; Job Training; *Labor Force Development; *Lumber Industry; Management Development; Postsecondary Education; Productivity
IDENTIFIERS *Chile

ABSTRACT

Chile lacks a sufficiently trained work force of forestry professionals to support the economic growth. Chile's basic economic comparative advantages have been availability and low cost of land, high growth speed of species used in plantations, and a low-cost labor force. Economic development has brought a rise in labor costs and consequently a loss of basic competitive advantage. The only way to maintain the forestry sector's competitiveness is to raise its productivity. The first forestry technicians school was founded in 1966, and forestry vocational schools were created in 1995. A partnership must be established between the educational sector and the productive sector. The work force education effort must be addressed to all levels, both management, planning, and execution levels. The task must be shared between the state and the forestry industries and companies. Since 1980, two Chilean universities that were concerned about forestry professionals' training have joined in a curriculum evaluation study and established contact with specialists at the University of Arkansas. This international partnership has adapted the Vocational-Technical Education Consortium of States model to the Chilean situation. Results have included the forestry occupations analysis, preliminary occupational profile, and the process of training the trainers. (YLB)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

ED 407 570

ANALYSIS OF CHILEAN FORESTRY OCCUPATIONS: An International Partnership Model

Prof. Dr. Jaime Millan H.
Prof. Marilu Rioseco G.
Universidad de Concepcion - Chile

Prof. Dr. Hernan Peredo L.
Universidad Austral - Chile

Prof. Dr. Barbara Hinton
Dr. John Townsend
University of Arkansas - USA

Dr. Ronald McCage
VTECS - USA

1. INTRODUCTION

Economic development of any country relies very strongly on the capacity of its people to permanently innovate and to improve productivity. Thus, it will be possible to secure competitively in global markets. This capacity must be developed by educating people. Therefore, the educational processes, that is the curriculum as a whole, at all levels, must ensure an appropriate development of the students knowledge, skills and abilities necessary for their future participation in society. This is specially important at the level of vocational training.

There are countries in which the economic development in the last decades has been quite accelerated. Sometimes, however, the educational development does not run parallel to the economic one. This has been the case in Chile. In such a case, it represents a problem because the production sector does not work with the labor forces required to support the economic growth. It is thus necessary that educational developments are somehow articulated with economic growth, it is necessary to establish a sort of partnership between the educational sector and the productive sector.

Worried by the above situation especially in the case of forestry professionals training, research groups in two Chilean universities began a curriculum evaluation study. Thus at the same time, both groups started to work together and also established contact with USA specialists, giving thus birth to the partnership described in this paper.

First we will describe how the Chilean economy in general, and the forestry sector in particular, has evolved in the last 20 years, how this growth has brought together needs for professional training, and how the educational sector has diversified its offer trying to satisfy these demands.

Next we will describe how we are making professional training pertinent to the forestry sector needs, how an international partnership was developed and how we adapted the USA VTECS model to the Chilean situation.

CE 074003

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)
☑ This document has been reproduced as received from the person or organization originating it
☐ Minor changes have been made to improve reproduction quality
• Points of view or opinions stated in this document do not necessarily represent official OERI position or policy

PERMISSION TO REPRODUCE AND DISSEMINATE THIS MATERIAL HAS BEEN GRANTED BY
J Millan
TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

BEST COPY AVAILABLE

Finally we will discuss some of the current results of the international partnership and its benefits both for the USA team and for the Chilean team along with implications for articulation, integration and curriculum development among educational delivery systems for the forestry occupations in Chile.

2. ECONOMIC DEVELOPMENT IN CHILE AND ITS IMPACT ON EDUCATION: The case of the forestry sector

In spite of having the appropriate soil and climate conditions for woods growth, up to 1970 the forestry sector in Chile had a development based only upon use of natural forests, without specific care for reforestation and for an adequate management of the resources. At the very beginning of the seventies, reforestation programs were implemented, rising as a consequence the annual rate of plantation from 5,000 to 20,000 hectares. Thus it began an industrial development based almost exclusively upon cultivation of pinus radiata species. In 1974, the state begun to subsidize reforestation actions and management of plantations, raising then the annual plantation rate to 120,000 hectares. These actions have brought Chile to the situation in 1996, where the country has 1,6 millions hectarea planted, which means a growth of 10 times in less than 20 years. Forestry products exports have had an increase of 80 times in the same period: from 30 millions to 2.4 billions dollars per year.

Now, Chile represents approximately 1% of the world wood harvest and around 1.5% from the international forestry commerce. Chile's competitors are Canada and Suecia, their exports being 18 and 10 times larger respectively. The challenge is now to increase Chilean participation to 3% in the year 2010, which would mean making full use of its forestry potential.

The above development was supported by basic economic comparative advantages, such as availability of land combined with low cost of land, high growth speed of species used in plantations and availability of low cost labor force, compared to international standards.

However, the forestry sector is changing. The growth and internationalization of the Chilean economy has impaired the currency exchange rate, which means a higher cost in absolute terms for all non transable components of forestry products. Together with this, the larger economic development has brought a rise in the cost of manpower. An analysis of this change results in predicting bigger rises in labor costs and consequently a loss of basic competitive advantages. The only way to maintain the forestry sector competitive is to rise its productivity.

Let's now look at education. In Latin America, from the very beginning, universities were noticeably important institutions, having strong social, political and cultural influences in all Latin American countries. The state administered and had control upon all educational systems. In the case of Chilean forestry education, it started at the level of forestry engineering in 1952 in Santiago. The first Forestry School was founded by the Universidad de Chile, the oldest and main Chilean state university. It was followed by the Universidad Austral de Chile in 1954, located in Valdivia, 800 km south of Santiago. In that time Valdivia was the largest forestry development in the country, based upon exploitation of natural resources.

Up to 1966, due precisely to the low technological level of the forestry activity, articulation in a professional family was not seen as necessary. Therefore, the only professionals trained at universities were forestry engineers. Exhaustion of the natural woods begun to be perceived and the sector responded with forestry development projects which were now mainly based upon plantation of foreign species. This situation required the use of higher skilled workers.

The Universidad de Concepcion was the first one who thought about a Forestry Technicians School and founded it in 1966. Not much later, the Pontificia Universidad Catolica de Chile created two Forestry Technicians Schools, one in Talca (1973) and one in Temuco (1974). Training for wood processing begun also to be seen as necessary, and in 1966 the Universidad Tecnica del Estado, traditionally oriented to training of high level technicians, created in Concepcion the School of Wood Execution Engineers.

The changes in demands from the forestry sector, due to the impulse given by the government measurements initiated in 1974, led the Universidad de Concepcion to create its Forestry Engineers School in 1977.

One of the economic principles which guided the government actions was the economy liberalization and the decrease of the state influence in all aspects of the nation's life. Among the actions taken, health services and social security services were transferred to the private sector. In the field of education it was also sought to enhance private initiatives.

It was in 1981, 7 years after the forestry sector fast development has begun, the Government also saw the need to liberalize the Higher Education System. Professional Institutes were created as Higher Education Institutions that have the mission of training professionals whose titles do not require a previous bachelor's degree. Also Technical Training Centers were created and regulated by law. They are also defined as Higher Education Institutions, having in this case the mission of training technicians for two main objectives: to satisfy the growing demand of postsecondary training, and to establish an articulated system within the Higher Education System that could allow a sequential specialization of those interested on having it. Another law handed over to the Universities the exclusive right to grant academic bachelor's, máster's and doctor's degrees and also certain professional diplomas, that previously require a bachelor's degree in the corresponding subject area. The same law established the conditions and requirements for an enlargement and substantial modification of the educational system, giving much more freedom and making the foundation of new universities much easier .

Many new Universities, Professional Institutes and Technical Training Centers were founded and explosive growth of the system takes place, the most explosive ever seen in the history of education in our country. At the end of 1995 the Higher Education Systems consists of 267 institutions.

Vocational Schools also were reached by the liberalization of the educational system. Private corporations controlled some schools and created careers which were seen as answer to the different sectors' demands. Forestry vocational schools were thus created.

As a whole, in 1996 forestry education is supported by 67 schools. The situation is shown in Table 1

TABLE 1: FORESTRY EDUCATIONAL INSTITUTIONS IN CHILE, IN 1996

LEVEL	N	%
Vocational High Schools	29	43
Technical Training Centers	8	12
Professional Institutes	9	13
Universities	21	32
TOTAL	**67**	**100**

If we analyze the above information we see no balance among the different educational levels and if we look into the training curricula, we see almost no difference between those for training engineers and those for training high school leavers.

If we look at the World Competitiveness Report prepared by the World Economic Forum we find Chile in place 22 among 41 developed and emerging countries which have options in the global world market. The mentioned strengths are the internationalization of its economy, the quality of management and the turning of the country into an international financial center. Mentioned weaknesses, at the same time, lie in the field of human resources education, scientific and technological development and labor forces productivity.

With respect to productivity, which is very low, it is necessary to mention that only 9% of the work force has had training. This means that workers have a recycling opportunity each 15 years, which is quite poor when compared, with countries like Korea for instance, which provides retraining opportunities to workers each 5 years.

A very big effort is therefore required in work force education. This effort must be addressed to all levels, both management, planning and execution levels. Education is especially required at the execution level because available data report that 87% of workers do not have formal training for the work place in which they are employed. In most of the cases, they learn to work in the workplace, watching others and following their peers' instructions, which means reproducing the same mistakes.

Training of new work forces and supervision personnel required to accept the production challenges of the coming century should be offered in vocational schools. This task must be a shared task between the state and the forestry industries and companies.

3. THE HISTORY OF THE PROJECT - Developing partnerships

Around 1980, aware of the challenge which was about to start, both at the Universidad de Concepcion and Universidad Austral, in Chile, research groups started evaluating the curriculum for forestry professionals training. At first, the effort was concentrated on the internal consistency of the curriculum and the relationship among its elements.

The second task was the external evaluation of the curriculum, that is, the search for indicators of the curriculum development quality. At this point we find the first evidence of the partnership: teams from the two universities joined their research efforts for the sake of a better quality in forestry professionals training.

The next step in the study, around 1984, was to look for information from the forestry professional sector. The idea behind this action is that a training curriculum is first legitimated when the trainees adequately respond to the requirements of the professional world. Forestry engineers and forestry technicians, as individuals, collaborated by writing statements related to the traits which characterized successful forestry professionals. The partnership evolved to its next stage: forestry engineers became involved in the study. So was it possible to identify some traits of the professional profile. These traits, together with the forestry field knowledge, included some very important attitudinal traits which could be used as a basis for the curriculum development.

The University of Arkansas' (Department of Vocational & Adult Education) Involvement with Competency-Based Education

Individuals within the Department of Vocational and Adult Education, The University of Arkansas, Fayetteville, have been involved in criterion-referenced education for over a decade. A special unit within the department was established in 1986 to work with the Division of Vocational-Technical Education, Arkansas Department of Education in the development of criterion-based assessment for vocational programs within the state. The unit became initially involved with V-TECS for the purpose of establishing and maintaining the State's test item banks. Since that time, criterion-referenced testing has been conducted annually for secondary vocational programs throughout the state including in the program areas of agriculture education, business and marketing education, home economics education, and industrial and technical education.

Test items, which are matched to course content, are maintained in centrally administered test item banks. Criterion-referenced tests are drawn annually and administered to all vocational education students within the state. Administration of the tests is handled at each local educational agency by a designated test administration. The Department of Vocational and Adult Education is responsible for printing, distribution, scoring and reporting of the tests. Approximately 80,000 to 90,000 students are tested annually.

Competency-based material upon which the criterion-referenced test are drawn are developed by a team of researchers, instructors and writers. In addition, occupations are analyzed. The occupational

results in the development of duty/task lists, related equipment and work aids lists, performance objectives and standards, enabling competencies, related academic skills instructional elements, and criterion-referenced test item banks.

The V-TECS Competency-based Vocational Education Developmental System

Since its formation in 1973, the Vocational-Technical Education Consortium of States has remained dedicated to the original mission of providing high quality, business and industry validated, competency-based vocational-technical outcome standards, curriculum resources, and assessment vehicles.

By sharing services, technology, and resources, V-TECS seeks to do its part to assure that comprehensive vocational-technical education programs are based on what a person performing the job actually does.

V-TECS promotes the systematic development and implementation of competency-based vocational-technical education through: the analysis of jobs and organization of job related information; the development of vehicles for assessing learner achievement; and the design, development, and/or identification of instructional materials that provide a validated link between instruction/training and employment.

In order to standardize the analysis products produced by the twenty-four state members of V-TECS, a developmental system has been developed, tested and refined. The system produces consistency between development teams and resulting products. It is the consistency of quality which makes V-TECS competency-based products of value to education, business and industry.

The V-TECS developmental system consists of five phases: administration, task list development, criterion-referenced test item bank development, instructional element development, and the dissemination and utilization of the products.

Administration Phase

The elements of the administration phase are intertwined with all other phases within the system. Beginning with the determination of the consortium priorities by the technical coordinators and board members representing each state, the administration seeks to reflect the needs of its members. The administration then execute product agreements with the member states. During the other phases the administration team monitors product progress and quality at periodic interludes. The administration team also serves as trainers, mentors and coaches for product developers.

Task List Development Phase

The task list development phase has various subdevelopmental elements, including:

1) the development of a national survey for the validation of a duty task list,
2) the development of a tools, equipment, and work aids list,
3) the expansion of the task to reflect performance objectives, including specific standards, and the delineation of performance steps, and
4) the analysis of the task and performance elements for the determination of enabling competencies and related academic skills.

The duty task list development is a process which begins with a literary search, to identify the state-of-the-art research related to the occupational domain. In combination with literary searches, the initial task list is developed through questioning and observation of incumbent workers. With the duty/task list, a tool, equipment and work aids list is also developed which reflects the duty task list. Once the preliminary duty task and equipment list are developed a survey is sent to a national sample of the occupational population. Based upon the responses of those surveyed a revised duty task list and a related tool, equipment and work aids list are finalized.

With the validated lists in hand, a team of incumbent workers and subject matter experts analyze each task for the preparation of performance elements. The Performance Objective is written for each task and consists of:

a) Conditions of performance of task which specifies necessary tools, equipment, work aids, and environmental factors related to performance of the task;
b) Performance of the task to be done, and
c) the Standard of performance which is an observable or measurable standard of performance deemed appropriate for successful completion of the task by incumbent workers. The Performance Steps are written in a sequential listing of steps ordinarily followed when performing the task.

The final elements of the task list development phase involves the analysis of each task to delineate enabling competencies and related academic skills. The enabling competencies are cognitive knowledge, psychomotor skills, and work related behaviors that are prerequisites to the mastery of the related task. Related academic skills are basic academic skills that a worker needs to know to competently perform a given task. Using the Basic/Essential Skills Taxonomy the related academic skills are coded in four areas: Free Enterprise, Language Arts, Mathematics, and Science.

Criterion-referenced Test Item Bank Development Phase

Assessment for each task is developed and field tested. Each item in a V-TECS item bank is coded to a specific Duty and Task. Test items are either cognate or performance in nature and are classified by the level of learning domain. Cognate items are normally written in either multiple choice or matching format. Performance items are written to test the psychomotor domain of learning. The learner is required to demonstrate performance of a skill or produce a product, or both. Often this type of item is presented in the form of a checklist. Items are validated by the utilization of recognized research and statistical methodology, including the review of each item through item analysis.

Instructional Element Development Phase

Instructional elements are written for each task utilizing the teaching and training methods and or procedures best suited for the learning of the task and its performance elements. Instructional resources are given as a base for development of instruction and or training references. Worksheets and additional materials are custom developed and are referenced to instructional activities.

Dissemination and Utilization Phase

This phase is a compilation of all products into a single database. To facilitate the compilation, a referenced database, V-TECS DIRECT, was developed. The software package is designed for storing and retrieving V-TECS products. It allows easy review and or selection of specific element of interest. It also allows the customization of the existing material, with the possibility of augmenting it with locally relevant material. The occupational elements are distributed by V-TECS to the participating member states and local education agencies from the state's curriculum center the occupational elements can be distributed according to existing agreements between the state and V-TECS.

In 1990 the group working at the Universidad de Concepcion met the USA team. Participation in a workshop about Competence based Education brought both groups together and the next stage of the partnership was initiated: the Chilean and the USA team prepared a research proposal which was presented to CONYCIT, the Chilean state funding agency. They obtained a 3-years grant (1995-1997).

The research project intends to:

- Identify the professional competencies of forestry engineers and forestry technicians, in terms of tasks and achievement standards
- Develop an occupational hierarchy for the forestry occupational family

- Develop a model for occupational analysis in the field of engineering

The development of the research project has contributed to consolidate the higher stage of the partnership, partners being now as follows:

Universidad de Concepcion - Universidad Austral
University of Arkansas - VTECS
CONYCIT
Forestry Occupational Sector
(industries and organisms)

The project progress brought new partners into the partnership. The necessary survey of forestry professionals training institutions gave information about the lack of a competence based approach to vocational training at high school level. Another funding agency, a private one, Fundacion Andes, allocated funds for a workshop addressed to principals of Vocational Schools. The goal was to provide in-service training for developing competence based curriculum for their trainees who would enter the forestry occupation. The product of the workshop, conducted through 1996, should be a Competence-based Curriculum Proposal developed under the adapted VTECS model.

At this stage, the partnership has already linked Vocational Schools, Universities, Chilean and North American research teams, private and state funding agencies, forestry industries and forestry organisms. Next partner seems to be the IDB.

4. VTECS MODEL ADAPTED TO CHILE

a) The Model

Competency-Based Education

Competency-based education is based upon the determination of the skills, knowledge, and habits of the mind that students should be able to demonstrate after completion of a program of study. The philosophy of competency-based education is that high expectations will be held for all learners. Based upon Benjamin Bloom's work on "mastery learning" at the University of Chicago, competency-based education (CBE) emphasizes that all learners can master desired competencies if educators vary time and instructional methods.

There exists five essential elements of competency-based education. First, the competencies to be acquired by the learner are carefully identified, verified, and made public. This means that the competencies are carefully researched to identify those competencies necessary for the learner to function well within a defined occupation or academic area. The competencies are then verified by incumbent workers and experts within the field. The verified competencies are then made open for

public comment and review so that all stakeholders will understand what will be expected of the learner to achieve the competency.

Second, what is taught (i.e., the competencies) which are identified and verified are often expressed as:

1) duties or functions,
2) tasks,
3) performance standards,
4) behavioral objectives for knowledge and skill,
5) related academic skills, occupational specific skills, and/or
6) general workplace skills.

Third, the instructional program is designed to assist students achieve each specified competency. It provides for different individual's learning styles. The program provides for a range of learner abilities.

Fourth, the assessment of the learner's competency takes into account both knowledge and attitude. The assessment requires performance as the primary source of evidence that the learner has mastered the competency.

Fifth, individuals progress through the instructional program at their own rate by demonstrating the attainment of specified competencies rather than time or course completion.

Competency-based education's strengths are found in the five focus points of the theory. Competency-based education:

1. clearly identifies what an individual should learn,
2. assesses each individual's progress on based upon criterion-based, demonstrated achievement,
3. accommodates individual learning techniques,
4. provides sufficient time and assistance for each individual to realize his or her potential, and
5. allows the educational institution to be a success oriented environment.

b) How the Model has been adapted

V-TECS Competency Based Vocational Education developmental systems has six phases: the administration phase, the task list development phase, the task analysis phase, the criterion referenced test item bank development phase, the instructional element development phase and the dissemination and utilization phase.

In our case, since the main question was not to develop educational products but to identify first the competencies which could enable us to develop an occupational hierarchy for the forestry sector. The adapted model consists of only two of the above phases: the task list development phase and the task analysis phase. Nevertheless, the model includes some other phases which were found necessary for the completion of them. In the original model, some of them are part of the Task List Development

Phase. They mainly relate to the Target Population Identification and Sample Selection, to the Occupational Inventory Development.

Our model requires as a first task the identification of all forestry industries and companies, which would constitute our target number one. In order to Select the Sample, the model also requires a complete characterization of forestry industries and companies in terms of various indicators pertinent for the study. At the same time, the model requires to Identify the Target Population of Forestry Professionals in terms of other relevant indicators which allow the Sample Selection. It is then that the Occupational Inventory can be developed.

However, the model considers the fact that more than one inventory is required: forestry occupation is complex and there are many different occupational positions, actually not standardized among the different industries and companies. Therefore the model includes a phase where forestry occupational positions are clustered according to responsibilities and tasks identified through a preliminary on site survey and a questionnaire. It might be recognized that the Task Analysis Phase is consequently included in the Task List Development Phase, in a first level. Later on, it must be taken in a second level in order to identify the different levels of the occupational hierarchy.

In the modified model, the second level Task Analysis Phase considers a curriculum analysis activity called Curriculum Conference, where the occupational hierarchy is validated with the help of peers. In this case, the peers are representatives of the forestry occupational sector.

(See Flowcharts)

5. RESULTS

a) The forestry occupations analysis (from grower to forestry engineer) in Chile

The forestry occupation analysis has resulted in a complete characterization of the Chilean forestry occupational universe. This characterization refers mainly to:

* Training institutions
* Training alternatives
* Industries, companies and other forestry sector organizations
* Work areas and type of forestry activities
* Type and number of existing forestry professionals in the sector

With respect to Training Institutions, Table 2 shows how their distribution among the different training levels.

TABLE 2: DISTRIBUTION OF TRAINING INSTITUTIONS PER LEVEL

TYPE OF TRAINING	N°	%
Vocational High Schools	29	43
Technicians	13	20
Execution Engineers	0	15
Engineers	15	22
TOTAL	**67**	**100**

It is necessary to mention that Vocational High Schools in the field of forestry education are new educational branches, therefore not many graduates are found in the working places. This is also the case of Execution Engineers Schools.

With respect to Employers (Forestry Industries, Companies or State Organizations), the universe with which we originally started working included 898 units. The reduced universe determined by answers of industries to the first survey is 162 units where a total of 1639 forestry professionals were identified.

When looking at the level of complexity of activities in the industries, they might be distributed as shown in Table 3.

TABLE 3: DISTRIBUTION OF EMPLOYERS PER ACTIVITY COMPLEXITY LEVEL

LEVEL	N	%
Very high complexity	81	50
High Complexity	55	34
Medium Complexity	14	9
Low Complexity	12	7
TOTAL	**162**	**100**

Table 4 shows the level of training of the 1639 professionals identified.

TABLE 4: DISTRIBUTION OF FORESTRY PROFESSIONALS PER TRAINING LEVEL

LEVEL	N	%
Engineer	785	47.9
Execution engineer	140	8.6
Technician	460	28.0
Voc Ed Graduate	254	15.5

TOTAL	**1639**	**100**

This population of employers was again reduced through answers to the second survey, amounting now to 66 units, were 447 forestry professionals are fully identified. These employers are characterized according to the total number of employers and the total number of forestry professionals employed by the company. Table 5 shows the characterization.

TABLE 5: DISTRIBUTION OF EMPLOYERS PER NUMBER OF EMPLOYEES

LEVEL	INDICATOR			
	Number of employees		Number of forestry professionals employed	
	N	%	N	%
Very high number	5	7.6	10	15.2
High number	23	34.9	11	16.7
Regular number	29	43.9	8	12.1
Quite few	9	13.6	35	53.0
None	0	0	2	3.0
TOTAL	**66**	**100.0**	**66**	**100.0**

We see that the forestry sector is evolving towards a state of high complexity production processes. Employers will have therefore growing demands for high skilled workers. The task of training personnel which responds to the sector demands is urgent and it requires a very careful identification of the occupational competencies.

b) The preliminary occupational profile

The analysis of information already gathered has not been an easy task. The first difficulty arose when trying to define the occupational positions. The sector is not normalized, like in the USA, where occupations are codified. Therefore a great effort has been done in clarifying occupational positions through duties. Professionals have been requested to describe their main duties using a verb, an action attached to that verb and a temporal or location description. Over 2000 statements were gathered which we analyzed according to the level of complexity of the task involved. The analysis has resulted in a characterization of occupational positions from two points of view. The first criteria was its place in the company organization. Table 6 shows the distribution.

TABLE 6: DISTRIBUTION OF OCCUPATIONAL POSITIONS IN ORGANIZATION LEVELS

LEVEL	N	%
Very High Responsibility	17	3,8
High Responsibility	42	9,4
Medium High Responsibility	101	22,6
Medium Responsibility	131	29,3
Low Responsibility	79	19,7
Very Low Responsibility	77	17,2
TOTAL	**447**	**100**

When looking at the complexity of the actions or global tasks involved in the duties, we come to the distribution shown in Table 7.

TABLE 7: DISTRIBUTION OF OCCUPATIONAL POSITIONS ACCORDING TO COMPLEXITY OF DUTIES

LEVEL OF ACTION	N	%
Very High Complexity	4	0.9
High Complexity	19	4.2
Medium High Complexity	72	16.1
Medium Complexity	189	42.2
Low Complexity	126	28.2
Very Low Complexity	38	8.4
TOTAL	**447**	**100.0**

Apparently, the lack of high skilled workers results in a concentration of high complexity tasks in a very small group of professionals, mainly in those occupying the managing levels. This situation is in total contradiction with the present tendencies of total quality management which seeks an horizontal articulation instead of a vertical one.

c) The process of training the trainers

The survey of the educational sector gave us information about the vocational schools curricula. As already mentioned, they are a poor copy of the ones designed for training engineers and totally lack and orientation towards competence based education.

Aware of the need to address the problem and develop a better work-place oriented vocational education, we contacted Fundacion Andes, a private foundation which supports educational research and training initiatives. It gave us a grant for implementing an in service training activity addressed to principals and to the curriculum advisers of around 20 forestry vocational schools.

During one year these teachers will receive training for identifying professional competencies and professional profiles for Forestry Technicians at the level of Secondary Education and for developing competency based curricula for forestry education. During January 1996 they attended an intensive workshop conducted by the Arkansas team. Theoretical work was combined with intensive field work in some forestry industries. From March to October they will survey the forestry sector with the aim of identifying the required competencies. The product of the course will be a curriculum proposal that includes:

- Identification of professional competencies
- Tasks List, duties and performance steps
- Task analysis and identification of related skills
- Detail of curriculum materials based on competencies
- A proposal of models for integrating general and technical education
- Achievement objectives
- Test Items, Reference criteria and evaluation instruments models
- A proposal of models for competence learning at the work place

This in service training activity closes the articulated training model and is also the last link of the partnership chain.

5. SUCCESSES AND CHALLENGES OF THE PARTNERSHIP

As with any partnership, there have been successes and challenges. Successes include the following:

* One result is an implemented and validated model, possible to be replicated in other countries.

* For VTECS, it means transculturation of the model, validation in Chile and an enlargement of the market for VTECS materials. The model, while having been used extensively in the US, had not previously been used in a South American country.

* For the University of Arkansas, it means academic contact enlargement, especially with the Spanish speaking world. The academic contacts by both the Chilean and US university personal resulted in increased awareness of cultural issues as well as educational and economic ones. Partners from both countries indicate that their own professional development has been enhanced by the international opportunities offered through the partnership.

* For Chile, it means new training possibilities, a better relationship of the production sector with the educational one, a validation of a model instead of a "blind" copy of a foreign model. The Chilean

partners report increased communication and collaboration between the production sector and the educational system within the country. The changes taking place within the educational delivery system have been greatly influenced by the partnership.

As with any partnership, there have also been challenges. A major challenge, of course, is communication among the partners. With sites located in two distant countries, the partners have utilized technology in order to communicate effectively. The Chilean and USA teams have corresponded via electronic mail primarily, both in the planning and implementation stages. In addition, the partners have been able to travel to one another's sites annually in order to plan and implement the model. Site visits have been extremely valuable to both the Chilean and USA teams. While in Chile, the USA team was able to visit sites representing all phases of the forestry industry in order to assist in the developmental phases of the project as well as assist in delivery of training.

Both partners have been aware of cultural differences between the two countries. Use of translators has been an essential component of the project. While the Chilean partners speak English fluently, the USA partners, for the most part, do not speak Spanish. Addition of a USA team member who had lived in South America previously, speaks Spanish, and understand the VTECS model has proven to be a very valuable asset to the project.

CONCEPCION, 1996.